reason related to distinguishing the invention over any known prior art reference. Accordingly, Applicant submits that no estoppel should apply to any limitation recited in any of the so amended claims.

The Commissioner is hereby authorized to charge any fees necessary for the consideration of this preliminary amendment to deposit account No. 19-0089.

Should the Examiner have any further comments or questions, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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Attachment: Appendices 1-6

APPENDIX 1

Changes to the title and the two paragraphs on page 1 of the specification:

[DEVICE FOR DETERMINING THE CHARACTERISTICS OF A RUNNING MATERIAL WEB]

--**DEVICE FOR DETERMINING THE CHARACTERISTICS OF A RUNNING MATERIAL WEB**--

--CROSS-REFERENCE TO RELATED APPLICATIONS--

The present application is a National Stage Application of International Application No. PCT/EP00/02250, filed March 14, 2000. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 199 11 395.5 filed on March 15, 1999.

--BACKGROUND OF THE INVENTION

1. Field of the Invention--

The invention relates to an apparatus for the determination of characteristics of a running material web and/or of a machine for its manufacture and/or refinement, in particular for use in paper making machines, preferably in the dryer sections of paper making machines, with at least one measuring device.

--2. Discussion of Background Information--

For the [optimisation] optimization of the manufacturing process of material webs, in particular of paper webs, it is desirable to know the operating state, for example of a paper making machine, and also its [behaviour] behavior on changes of the machine settings as well as possible. For this purpose mathematical models are also used which describe the entire paper making machine or individual sections of the paper manufacture. For the [optimisation] optimization of such models and also for the control or regulation of the

individual devices used in the manufacturing process, for example in a dryer section of a paper making machine, measuring devices are used in order to collect data which relate to different measured parameters, for example the moisture content of a paper web or the surface temperature of dryer cylinders. These data can serve as a basis for the models which describe the manufacturing and/or refinement process and be made available to control or regulating units by which the conditions at individual machine sections can be changed, for example by controlling corresponding setting members.

APPENDIX 2

Changes to the second and third paragraphs on page 2 of the specification:

--SUMMARY OF THE INVENTION--

[It is the problem (object) underlying the] The present invention [to provide] therefore provides an apparatus of the initially named kind which can be used as universally and variably as possible and which can also be used [at] in paper making machines.

The [solution to this problem takes place through the features of claim 1 and in particular in] invention thus provides that the measuring device has at least two degrees of freedom of movement respectively corresponding to a rotary movement or a linear movement for the detection of data relating to at least one measured parameter at a plurality of measurement locations.

According to one aspect of the invention, there is provided an apparatus for determining characteristics of a running material web including at least one measuring device. The at least one measuring device is movable and has at least two degrees of freedom of movement. Each of the at least two degrees of freedom of movement is at least one of a rotary movement and a linear movement. The at least one measuring device is adapted to detect, at a plurality of measurement locations, data relating to at least one measured parameter. The at least one measuring device detects data about at least one of the following measured parameters: measured parameters which relate to a characteristic value of air in a region of the material web; measured parameters which relate to the material web; and other measured parameters. The at least one measuring device may be located in at least one of a machine for manufacturing the material web, a machine for refining the material web, a paper making machine, and a dryer section. The measured parameters which relate to a characteristic value of air may comprise at least one of air temperature, air moisture, air flow, air flow direction and air flow speed. The measured parameters which relate to the

material web may comprise at least one of a thickness of the material web, a temperature of the material web, and a moisture content of the material web. The other measured parameters may comprise at least one of a temperature of dry air used to dry the material web, a dew point of dry air used to dry the material web, a temperature prevailing at or in a region of a surface of a dryer cylinder of a paper making machine, a permeability at a dryer sieve, a speed of air flow that is present at a surface of a dryer sieve, air humidity at an individual machine component, and air humidity at certain locations of the material web.

The at least one measuring device may be adapted to move while it measures and without interruption from data detection. The at least one measuring device may be adapted to simultaneously carry out the at least two degrees of freedom of movement. The at least one measuring device may be adapted to carry out the at least two degrees of freedom of movement one after the other timewise.

The at least one measuring device may be movable in at least a first direction and in at least a second direction. The second direction may be perpendicular to the first direction. The at least one measuring device may be movable in at least a first direction, in at least a second direction, and in at least a third direction. The second direction may be perpendicular to the first direction and the third direction may be perpendicular to the second direction.

The at least one measuring device may be movable, with respect to a running direction of the material web, at least one of parallel to the running direction and perpendicular to the running direction. The at least one measuring device may be movable, with respect to a running direction of the material web, at least one of along the running direction, transverse to the running direction, and vertically to the running direction. The at least one measuring device may be movable via a plurality of linear movements. The plurality of linear movements may comprise at least two linear movements. One of the at least two linear movements may be perpendicular to another of the at least two linear movements. The at least two linear movements may comprise three linear movements. One of the three linear

movements may be perpendicular to at least one of the other two of the three linear movements.

The at least one measuring device may be rotatable about at least one axis. The at least one axis may comprise at least a first axis and at least a second axis. The second axis may be perpendicular to the first axis. The at least one axis may comprise a first axis, a second axis, and a third axis. The second axis may be perpendicular to the first axis. The third axis may be perpendicular to the second axis. The at least one measuring device may be adapted to be oriented in any desired manner in space by executing a plurality of rotary movements. The plurality of rotary movements may comprise at least two rotary movements. One of the at least two rotary movements may have a first axis and another of the at least two rotary movements may have a second axis which is perpendicular to the first axis. The at least two rotary movements may comprise three rotary movements. One of the three rotary movements may have a first axis, another of the three rotary movements may have a second axis, and still another of the three rotary movements may have a third axis, with the second axis being perpendicular to the first axis. One of the three rotary movements may have a first axis, another of the three rotary movements may have a second axis, and still another of the three rotary movements may have a third axis, with the second axis being perpendicular to the first axis and with the third axis being perpendicular to the second axis.

The at least one measuring device may be adapted to move along any desired presettable curve in space and may be adapted to be oriented in any desired manner in space by executing a plurality of linear movements and rotary movements. The plurality of linear movements and rotary movements may occur simultaneously. The plurality of linear movements and rotary movements may occur one after another timewise. At least one linear movement of the at least one measuring device may be adapted to be changeable. At least one rotational movement of the at least one measuring device may be adapted to be changeable. An orientation of the at least one measuring device may be adapted to be

changeable.

The apparatus may further comprise one of a beam and a stationary frame, wherein the at least one measuring device is movable relative to the stationary frame or the beam. The at least one measuring device may be one of connected to and movably attached to at least one of a frame, a beam, and a machine. The at least one measuring device may be movably attached to a machine. The apparatus may comprise a mobile unit which can be used at different locations of a machine. The at least one measuring device may be movably connected to a joint. The joint may comprise at least one of a ball joint and a joint which enables a pivotal movement in at least one plane. The at least one measuring device may comprise at least one exchangeable measuring head. The apparatus may be adapted to utilize a plurality of different measuring devices. The at least one measuring device may be adapted to utilize a plurality of exchangeable measuring heads. The at least one measuring device may comprise a plurality of measuring devices. The plurality of measuring devices may comprise interchangeable measuring heads. Each of the plurality of measuring devices may be adapted to measure a different parameter.

The apparatus may further comprise at least one of a common operation unit and a control unit associated with the at least one measuring device. The apparatus may further comprise at least one of a drive unit, a supply unit, a data detection unit and an evaluation unit associated with the at least one measuring device. The apparatus may further comprise a frame, wherein the at least one measuring device is coupled to a frame. The frame may extend transverse to a running direction of the material web. The frame may be located beneath the material web. The frame may be located in a region of one of a dryer cylinder and a dryer roll. The frame may be located in a paper making machine, the frame being supported on both sides of the paper making machine. The at least one measuring device may be coupled to a beam. The beam may be one of vertically oriented and transversely oriented relative to a running direction of the material web. The beam may be located in a

dryer section of a paper making machine. The at least one measuring device may be movably disposed in a cellar of a dryer section of a paper making machine. The apparatus may further comprise a protective device for protecting the at least one measuring device. The protective device may be adapted to protect against downwardly falling articles. The protective device may comprise at least one of a scraper and a sheet metal shield. The apparatus may further comprise at least one of an electrical, a pneumatic, and a hydraulic drive for moving the at least one measuring device. The at least one measuring device may be adapted to be manually movable. The at least one measuring device may be rotatable about at least one axis and so as to be able to detect at least one measured parameter at a plurality of measurement locations.

The invention additionally provides for an apparatus for determining characteristics of a running material web in a paper making machine. The apparatus includes at least one measuring device. The at least one measuring device is movable and has at least two degrees of freedom of movement. At least one of the at least two degrees of freedom of movement is a rotary movement. At least another of the at least two degrees of freedom of movement is a linear movement. The at least one measuring device is adapted to detect, at a plurality of measurement locations, data relating to at least one measured parameter. The at least one measuring device detects data about at least one of a parameter relating to a characteristic value of air in a region of the material web and a parameter which relates to the material web.

The invention also provides for a method for determining characteristics of a running material web using an apparatus for determining characteristics of a running material web which includes at least one measuring device, the at least one measuring device being movable and having at least two degrees of freedom of movement, each of the at least two degrees of freedom of movement being at least one of a rotary movement and a linear movement. The method includes detecting, at a plurality of measurement locations and using the at least one measuring device, data relating to at least one measured parameter. The at

least one measuring device detects data about at least one of the following measured parameters: measured parameters which relate to a characteristic value of air in a region of the material web; measured parameters which relate to the material web; and other measured parameters.

The at least one measuring device may be located in at least one of a machine for manufacturing the material web, a machine for refining the material web, a paper making machine, and a dryer section. The measured parameters which relate to a characteristic value of air may comprise at least one of air temperature, air moisture, air flow, air flow direction and air flow speed. The measured parameters which relate to the material web may comprise at least one of a thickness of the material web, a temperature of the material web, and a moisture content of the material web. The other measured parameters may comprise at least one of a temperature of dry air used to dry the material web, a dew point of dry air used to dry the material web, a temperature prevailing at or in a region of a surface of a dryer cylinder of a paper making machine, a permeability at a dryer sieve, a speed of air flow that is present at a surface of a dryer sieve, air humidity at an individual machine component, and air humidity at certain locations of the material web.

APPENDIX 3

Changes to second full paragraph on page 6 of the specification:

A particularly good movability of the measuring device results in this way. A ball joint allows the carrying out of pivotal or rotational movements about a plurality of axes in simple manner. A measuring device which can be used in particularly versatile manner can be provided simply by a combination of the pivotal or rotational movements enabled by [means] way of the joint with a single linear movement.

APPENDIX 4

Changes to the paragraph bridging pages 7 and 8 of the specification:

The [solution of the problem underlying the invention also takes place by the features of the independent claim 29 and in particular in] invention also provides that the measuring device is rotatable about an axis at a plurality of measurement locations for the detection of data relating to at least one measured parameter.

APPENDIX 5

Changes to the paragraphs beginning with the first full paragraph on page 9 and ending with the first full paragraph on page 10 of the specification:

Further preferred embodiments of the invention are set forth in the [dependent] claims, in the description and in the [drawing] drawings.

--BRIEF DESCRIPTION OF THE DRAWINGS--

[The invention is described in the following by way of example with reference to the drawing, There are shown:]

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

Figs. 1 and 2 show perspective schematic illustrations in each case of a measuring apparatus in accordance with an embodiment of the invention having a plurality of degrees of freedom;

Fig. 3 shows a schematic side view of a measuring apparatus in accordance with a further embodiment of the invention used at dryer cylinders of a drying section in a paper making machine;

Fig. 4 shows a schematic view in the machine direction of a measuring apparatus in accordance with a further embodiment of the invention used at a dryer cylinder; and

Fig. 5 shows a schematic side view of a measuring apparatus in accordance with a further embodiment of the invention used in a dryer section of a paper making machine and protected by a protective device.

--DETAILED DESCRIPTION OF THE INVENTION--

In Fig. 1, a measuring device 10 of an apparatus of the invention which is attached to a frame 12 shown schematically in Fig. 1 is indicated by a parallelepiped. The frame 12 includes a cross member 18 serving as a beam which extends over a paper making machine (not shown) and is supported at the base at both sides of the machine via support elements 20.

APPENDIX 6

Changes to the second full paragraph on page 15 of the specification:

The measuring device 10 is located beneath a dryer cylinder 16 at which a scraper 44 is arranged. A protective device formed by a sheet metal shield 46 is provided for the protection of the measuring devices 10 against paper or paper residues detached from the dryer cylinder 16 by [means] way of the scraper 44. The measuring device 10 is protected from above by the sheet metal shield 46 without impairing the measurements carried out by [means] way of a measuring region l0a confronting the suction roll 42. The sheet metal shield 46 can be fixedly attached to the machine and extend along the whole movement region of the measuring device 10. It is also possible to mount the sheet metal shield 46 or another protective device to the movable measuring device 10.